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CT114 Lap Belt Arming Key Mod – User Trial

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Defence R&D Canada
Technical Note
DRDC Toronto TN 2010-077
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Canada

19 May 10

DRDC Toronto TN 2010-077

CT114 Lap Belt Arming Key Mod – User Trial

References

- A. RARM CT 114-2007-001 Rev 4 Tutor Parachute HBU-12 Key Interference with Lap Belt
- B. DRDC Toronto/CFEME STO/DEE project Agreement, Evaluation of The User Confidence In and In Service Performance of the CT114 Lap Belt Arming Key, 16 Feb 10, (1 Can Air Div HQ)
- C. C-12-114-000/MB-001 – Operating Instructions CT 114
- D. 1 CDN AIR DIV ORDERS Vol 5 5-305

Background

1. The Canadian Air Force modified the CT114 HBU-12/B Bartack Lap Belt Parachute Arming Key as a result of the Record of Airworthiness Risk Assessment (RARM), Ref A, generated from the CT 114159 Tutor aircraft accident in 2007. The key was being prevented from achieving a positive lock due to external interference sources. A modification to the key attachment was performed to prevent interference from affecting the achievement of a positive lock. There have been no records of positive lock failure since the modification. As per Ref B, 1 Canadian Air Division Headquarters requested an evaluation of Aircrew and Technicians confidence level of the in-service performance of the modified key. This request included a survey of users to determine if the mod is considered functional and an appropriate fix to the external interference issue.

Aim

2. This evaluation will determine the user confidence level and in-service performance of the HBU-12/B lap belt as well as recognize if there are any misinterpretations in the training. A secondary aim was for trial staff to observe technical, procedural, and training aspects for objective acceptability.

Method

Overview

3. This trial took place in two locations on two separate dates: Aerospace Engineering and Test Establishment (AETE), Cold Lake, Alberta, 16 Feb 10, and 431 Air Demonstration Squadron (AD Sqn), Moose Jaw, Saskatchewan, 10 Mar 10. There were 10 participants at AETE and 22 at 431 AD Sqn. The experimental session began with a group briefing in each location, designed to familiarize the participants with the protocol. After the group briefing, each participant's experimental session consisted of three activities: 1) donning their personal issue flying gear and life preserver / universal carrier as per their normal flying ops; 2) carrying out the CT114 strap-in procedure in the CT 114 cockpit from memory two

times whilst being timed and monitored for accuracy based on the Canadian Forces Technical Order (CFTO) checklist (Annex A); and 3) completing a questionnaire after completing the cockpit trial and exiting the aircraft. The trial staff observed all aspects of the technical, procedural, and training processes surrounding the modification and its implementation and usage. The participants were monitored for strap-in time to encourage a realistic evaluation scenario in terms of completing the task in a timely fashion.

Trial Participants

4. There were 32 trial participants, 31 males and 1 female. The length of service ranged from greater than 1 yr to 20 yrs plus. There were 17 pilots, 4 FTE's (Flight Test Engineers - 3 Military and 1 Civilian) and 11 technicians (1 Image, 6 Aviation, 2 Avionics, and 2 Aircraft Structures). All the participants of the trial had been trained and were currently qualified (excluding 431 Sqn technicians) on the CT 114 ejection seat strap-in procedure. Range of flying hours per month was:

- a) 20 to 30 for the 431 Sqn pilots;
- b) 0 (off season) to 20 (show season) for 431 Sqn technicians;
- c) 3 to 10 for AETE pilots;
- d) 1 to 2 for AETE technicians; and
- e) 1 to 4 for AETE FTE's.

Objective Assessments

5. The participants were monitored for accuracy of the strap-in procedure based on the checklist as detailed in Ref C.

Questionnaires

6. Participants completed a questionnaire (Annex B) designed to reveal their perceptions of the acceptability of the CT 114 Lap belt. The acceptability questionnaire was used to obtain feedback on the following human factors criteria:

- a) lap belt training;
- b) lap belt operation;
- c) strap-in procedure; and
- d) safety checks.

7. Participants rated the acceptability of the lap belt for each of the criterion on a 7-point Likert rating scale, where 1 means completely unacceptable, 4 means borderline and 7 means completely acceptable (Figure 1).

DIRECTIONS: Provide a rating of acceptability, using the 7-point scale below for the following questions. Give comments in the box provided below as required or as necessary. If you make a mistake on the rating assessment, circle the correct answer. If you rate an item as four (4) or below, please explain why in the comments section.

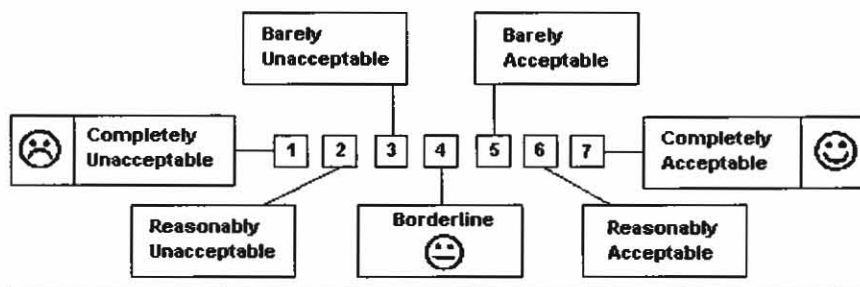


Figure 1: Standard Seven-Point Likert Rating Scale of Acceptance

Statistical Analysis

8. Sample size for the study was $n=32$. The statistical analysis employed was descriptive only, utilizing range and percentage of responses, as well as the means of the strap-in timings.

Results

Overview

9. Table 1 below contains a summary of the questionnaire data. For the purpose of this trial, evaluation criteria were considered acceptable rated “borderline” (4) or better. The detailed data derived from the survey is presented in Annex C. The trial staff saw no problems associated with any of technical aspects, procedures, or training.

Time Taken For Strap-in

10. Time taken to complete an accurate strap-in procedure is shown in Table 2. It is notable that times were generally twice as long at 431 Sqn as at AETE, perhaps reflecting the higher percentage of technician participants. There is no specified time requirement to complete the strap-in procedure. The observed times and time differential had no bearing on the evaluation of the lap belt modification.

Accuracy of Strap-in procedure

11. In both AETE and 431 AD Sqn, the strap-in procedures were accurately followed based on the Ref C procedure. On two occasions in each location, aircrew performed the procedure with a minor change in order (e.g., Annex A steps 1 & 2), but did not change final location or routing of the various components. The minor changes did not have any bearing on routing and as such did not have any Flight Safety implications.

Table 1 – Summary of Question Results Showing Numbers and Percentages of Acceptable Ratings

<u>Evaluation Criterion</u>	<u>Acceptable rating *¹</u>
<u>Training</u>	
1. Frequency	31 (97%)
2. Methodology	32 (100%)
3. Content	32 (100%)
4. Overall Acceptability	32 (100%)
<u>Operation</u>	
1. Ease of use wearing Winter flying clothing	29 (91%)
2. Ease of use wearing Winter flying clothing and LP/UC	29 (94%)* ²
3. Ease of use wearing Summer flying clothing	31 (97%)
4. Ease of use wearing Summer flying clothing and LP/UC	29 (94%)* ²
5. Effectiveness of lap belt	32 (100%)
6. Overall usability	31 (97%)
<u>Strap-In Procedure</u>	
1. Simplicity	29 (91%)
2. Easily Remembered	31 (97%)
3. Speed of execution	30 (94%)
<u>Lap Belt Checks</u>	
1. Ease of use to perform visual	30 (94%)
2. Ease of use to perform free play (push past) check	31 (97%)

*Note 1 – If a response was “borderline” or better, the criterion was indicated as acceptable.

*Note 2 --These two questions had only 31 respondents vice 32.

Table 2 – Strap-in Times

Unit	Time (Seconds)	
	Average	Range
AETE	136	86 - 205
431 Sqn	269	170-350

Participant Comments

12. The most common concern reflected in participant comments relates to bulk of certain clothing configurations, expressed by only 2(6)% of participants. In all cases, including participants with very little strap-in experience, participants were able to complete the strap-in procedure and achieve a positive lock. Despite the concern of a few about the possibility of an error or omission, visual and lock checks are required and were again always able to be achieved. For the same reason, use of a color coding system on

the cam lock as suggested by one participant, if possible, would provide at best marginal benefit to the user.

Summary

13. A battery of scientific human factors performance tests and questionnaires were conducted by 32 participants at AETE and 431 AD Sqn to evaluate the user confidence in and in-service performance of the HBU-12/B Bartack lap belt parachute arming key modification. The criteria evaluated included accuracy of executing the strap-in procedure, along with a detailed questionnaire looking at user confidence in lap belt training, and acceptability of lap belt operation, strap-in procedure, and safety checks. All participants were able to successfully complete the procedure. There were no significant participant or evaluator concerns about the lap belt configuration, use or training.

Conclusions

14. It is concluded that the CT 114 user community has confidence in the usage and in-service performance of the lap belt modification. It is also concluded that with the modified lap belt there was no evidence of interference that would affect achievement of a positive lock.

Drafted By (Principal Investigator)

 19 May 10
Capt J Weathered Date

Reviewed By

 19 May 10
B Michas Date

Approved By Head JOHSC

 10 June 10
LCol P Burke Date

Attachments:

Annex A – Strap-in Procedure

Annex B - L-728 Protocol Questionnaire

Annex C – Questionnaire Data

Strap-In Procedure

1. Tighten Para leg straps, tuck loose ends under legs.
2. Attach seat-pack airlock fasteners to parachute harness clips, tuck loose ends under thighs.
3. Ensure Maritime Lanyard is clear of the lap belt to prevent damage. Route as follows:
 - a. outside right thigh;
 - b. over right parachute thigh strap;
 - c. to LPSV lanyard (routed under right parachute strap); and
 - d. under all seat lap and shoulder straps.

Warning : Maritime lanyard must be routed under both straps of the right hand lap belt. If lanyard is mistakenly routed between the straps, seat man separation will be severely compromised.

4. Position left shoulder strap loop onto left lap belt buckle tongue.
5. Position negative "G" strap onto lap belt buckle tongue.
6. Position right shoulder strap loop onto lap belt buckle tongue.
7. Route parachute arming key under shoulder harness, place arming key (pins facing away from buckle) onto lap belt buckle tongue.
8. Rotate lap belt to view both locking cam cut-outs, press both side of lap belt fittings together, witness the locking cam rotate into locked position.
9. **Perform Locking Cam Cut-Out Check** - check both locking cam cut-outs are visibly in the locked position - (cut-outs appear the same as before the lap belt fittings prior to be pressed together). **This check is essential to confirm a positive lock of the lap belt.**
10. **Perform Free Play (Push Past) Check** - Press mating ends of lap belt fittings together to demo ability to push beyond the locking point. **Push Past provides a "springy" feeling and is an essential indication of a positive lock.**

Caution: ensure nothing is caught in the free space between the arming key and the buckle

11. Center and tighten lap belt, stow ends using Velcro.
12. Lean forward, tighten negative "G" strap, fasten the Velcro strap.
13. With shoulder harness unlocked, lean backwards until head touches headrest, adjust shoulder straps until yoke of harness rests against back of neck.
14. Attach seat oxygen hose to post on lap belt, fastener smooth face up, oxygen quick-disconnect.
15. Attach oxygen quick-disconnect to oxygen mask hose quick-disconnect.

Annex A – Strap-In Procedure

16. Connect emergency oxygen bottle hose to oxygen quick-disconnect- ensure emergency bottle hose is routed between seat shoulder harness and connect oxygen mask hose retaining strap to parachute harness.
17. Connect intercom cord.

CT 114 Lap Belt Questionnaire

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

Instructions:

Print the first 3 letters of your last name and the last 3 digits of your service number in the space provided at the top of each page.

Answer all the questions.

Use a blue pen and fill in the circle which best describes your opinion. Where written answers are requested, please print clearly and stay within the squares, and if you require extra space please feel free to write on the back side of the page (indicating the question number you are answering).

This questionnaire is divided into three parts. They are as follows:

Part 1 – Personal Information

Part 1 records personal information, including your identity. Note that in the data analysis and report, **no participants will be individually identified**. The collection of personally identifying information is to allow the experimenter to contact you if there is a response that is illegible or if additional detail is required. All data will be reported on anonymously and via descriptive statistics.

Part 2 – Acceptability of CT114 Lap Belt Training

Part 2 focuses on the training personnel receive in using the CT114 lap belt and arming key. The definition of the acceptability ranges is given at the beginning of Part 2. Keeping the top of Part 2 visible while completing the other pages might be helpful. If you made a mark and then changed your mind, fill in the better answer and mark the wrong one with an X.

Part 3 – CT114 Lap Belt Acceptability

Part 3 focuses on the usability of the CT114 lap belt and arming key. Some questions require complete answers. Please print clearly, and use the back side of the page if there is not enough space. If you use the back side, please indicate the question number that you are answering.

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Annex B - L728 Protocol Questionnaire

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

Part 1 – Personal Information

Please PRINT your answers legibly in the white space provided.

1. Rank	
2. Unit	
3. Section	
4. Current Position	
5. Months in Position	
6. MOSID	

7. Ejection seat trainer certification date	
8. Training date on aircraft type	
9. Flying hours on aircraft type	
10. How many times per month do you fly?	
11. How often do you receive refresher training on the CT114 strap-in procedure?	

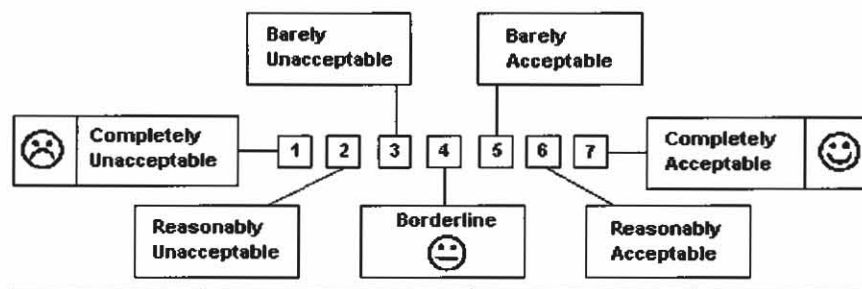
	Less than 1 Year	1 year to less than 5 years	5 to 10 years	10 to 15 years	15 to 20 years	20 years or more
12. Time in military	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Time in MOSID	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name _____ Last 3 digits-service number _____

Part 2 – Acceptability of CT114 Lap Belt Training

DIRECTIONS: Provide a rating of acceptability, using the 7-point scale below for the following questions. Give comments in the box provided below as required or as necessary. If you make a mistake on the rating assessment, circle the correct answer. If you rate an item as four (4) or below, please explain why in the comments section.



Please rate the CT114 lap belt strap-in procedure training you received for the following items:	User Acceptance Rating						
							
	1	2	3	4	5	6	7
14. Frequency (How often you receive refresher training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Methodology (The way content is presented in training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Content (What you are taught during the training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Overall Acceptability of training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Can you recommend any changes to the CT114 lap belt training program?							<input type="radio"/> Yes <input type="radio"/> No
19. If yes, please describe:							




First 3 letters-last name ____ Last 3 digits-service number ____

20. Do you feel that you have been adequately trained on how to properly secure the CT 114 lap belt?	Yes	No
	O	O
21. How often do you review the strap-in procedure for the CT 114?		
22. Do you have any other comments regarding the CT114 lap belt training that you have received?		

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

Part 3 – CT114 Lap Belt Acceptability

Please rate the acceptability of the CT114 lap belt for the following items.	User Acceptance Rating						
							
	1	2	3	4	5	6	7
23. Ease-of-use while wearing winter flying clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. Ease-of-use while wearing winter flying clothing with LP/UC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Ease-of-use while wearing summer flying clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Ease-of-use while wearing summer flying clothing with LP/UC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Effectiveness of the lap belt (does the job)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. Overall usability of CT114 lap belt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. Can you recommend any changes to the CT114 lap belt lock mechanism?						Yes	No
						<input type="radio"/>	<input type="radio"/>
30. If yes, what are they?							

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Annex B - L728 Protocol Questionnaire

Annex X: CT114 Lap Belt Questionnaire




First 3 letters-last name ____ Last 3 digits-service number ____

Please rate the acceptability of the strap-in procedure itself for the following items.	User Acceptance Rating						
	⊗			☹			☺
	1	2	3	4	5	6	7
31. Simplicity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Easily remembered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. Speed of execution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. Do you have any concerns with the CT114 lap belt strap-in procedure as detailed in the CFTO?						Yes	No
						<input type="radio"/>	<input type="radio"/>
35. If yes, describe what they are:							
36. How do you determine if the lap belt is properly locked?							

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Annex B - L728 Protocol Questionnaire

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

Please rate the acceptability of the CT114 lap belt checks with respect to the following items.	User Acceptance Rating						
							
	1	2	3	4	5	6	7
37. Ease-of-use in performing visual check?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. Ease-of-use in performing free play (push past) check?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39. Please provide any comments you may have concerning these two procedures.							

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Annex B - L728 Protocol Questionnaire

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

40. When attempting to lock the lap belt, have you ever had anything block or impede the mechanism?	Yes	No
	O	O
41. If yes, what was it?		
42. Have you ever experienced a false lock with the lap belt mechanism?		
43. If yes, how many false locks have you experienced (best guess)?	Yes	No
	O	O
44. How do you ensure the lap belt is properly locked?		

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Annex B - L728 Protocol Questionnaire

Annex X: CT114 Lap Belt Questionnaire

First 3 letters-last name ____ Last 3 digits-service number ____

45. Please provide any other comments you would like concerning the ease-of-use of the CT114 lap belt strap-in procedure.

THIS SECTION FOR INVESTIGATOR USE ONLY		
Is identity data complete for all pages?	Yes	No
	<input type="radio"/>	<input type="radio"/>
Have all questions been answered?	Yes	No
	<input type="radio"/>	<input type="radio"/>
Date		
Investigator Name		
Investigator Signature		

Figure A1- Acceptability Ratings of CT114 Lap Belt Training

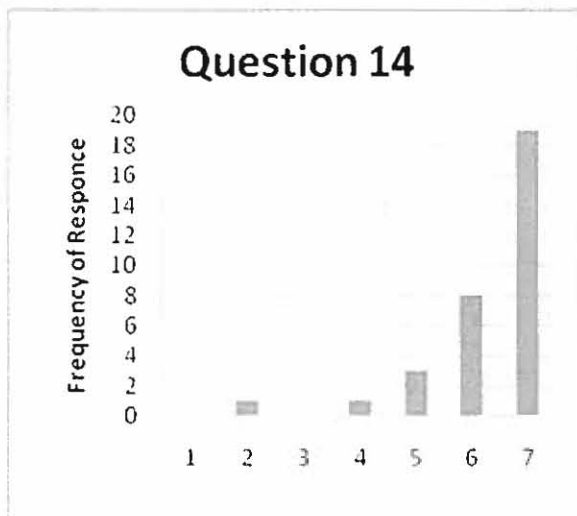


Figure A1-1 Frequency – How often do you receive refresher training.

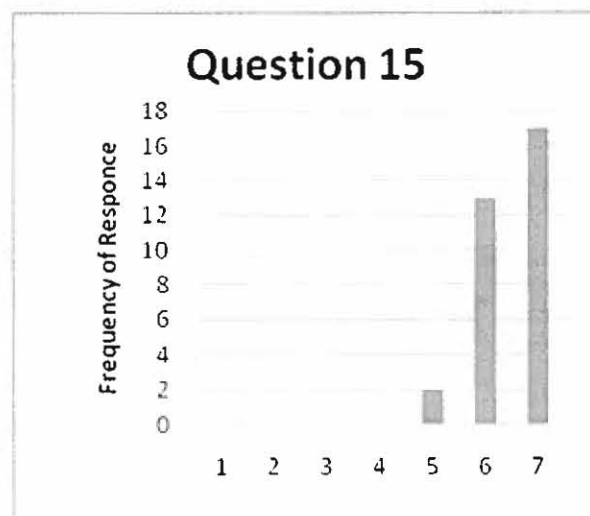


Figure A1-2 Methodology – The way the content is presented during training

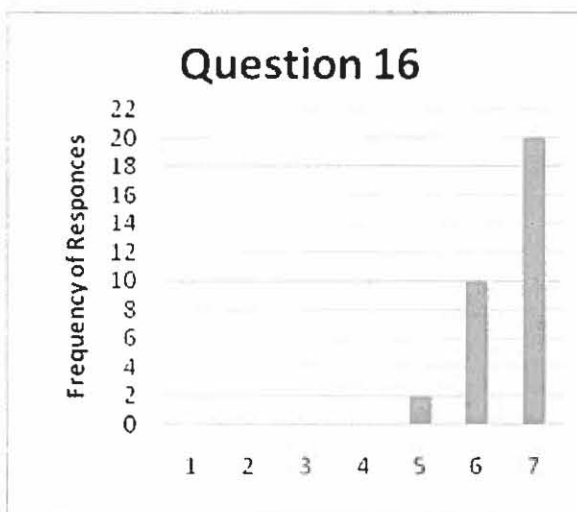


Figure A1-3 Content – What you are taught during training

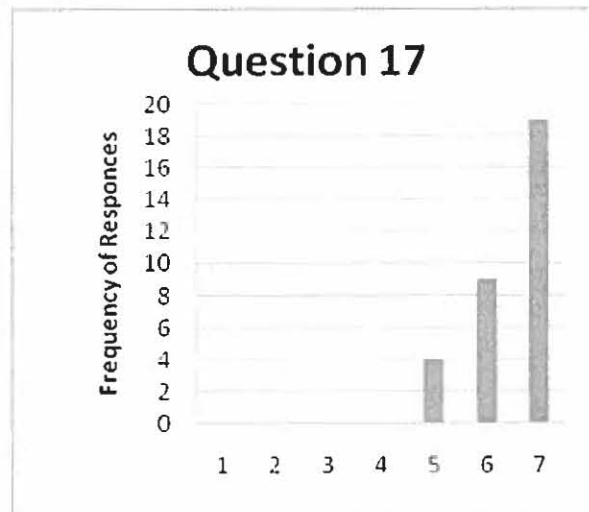


Figure A1-4 Overall acceptability of training

Figure A2 - CT 114 Lap Belt Acceptability

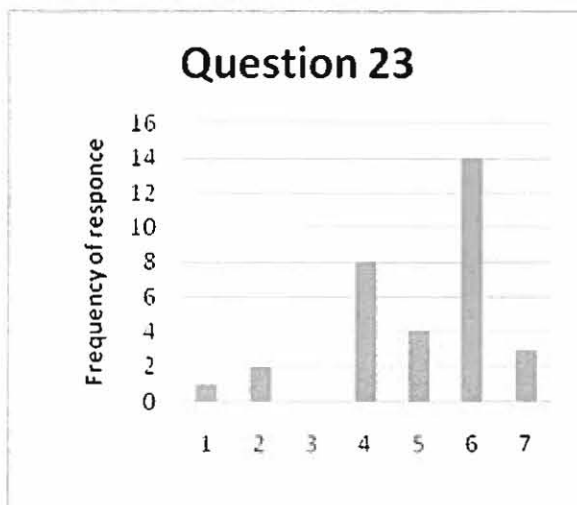


Figure A2-1 Ease of use while wearing winter flying clothing

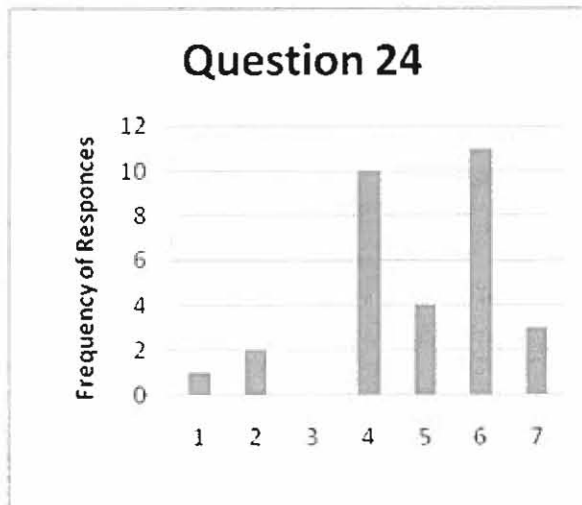


Figure A2-2 Ease-of-use while wearing winter flying clothing with LP/UC

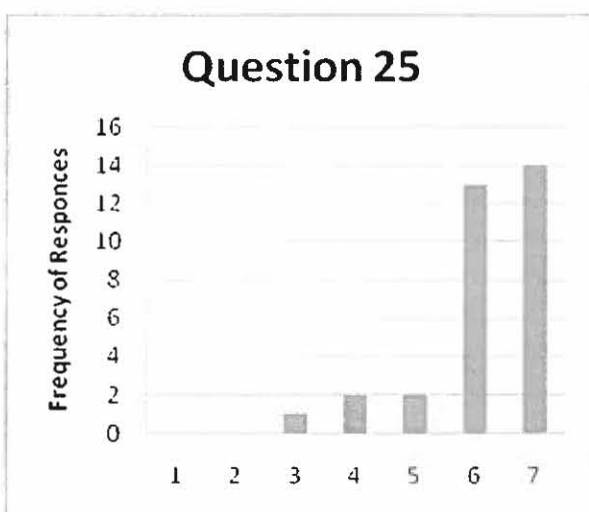


Figure A2-3 Ease-of-use while wearing summer flying clothing

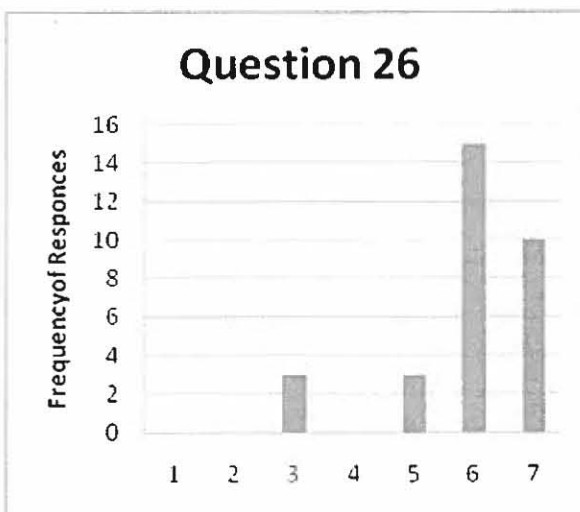


Figure A2-4 Ease-of-use while wearing summer flying clothing with LP/UC

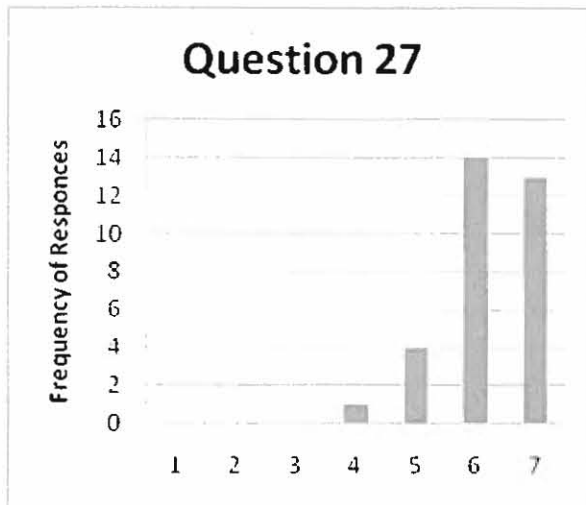


Figure A2-5 Effectiveness of the lap belt
(does the job)

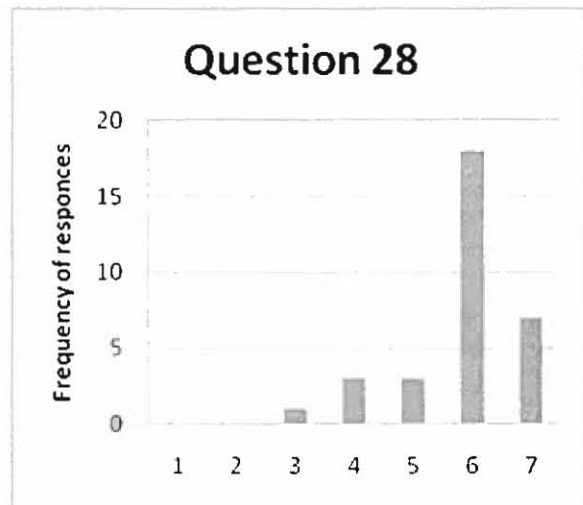


Figure A2-6 Overall usability of CT114 lap belt

Figure A3 -Acceptability Rating of the strap-in procedure

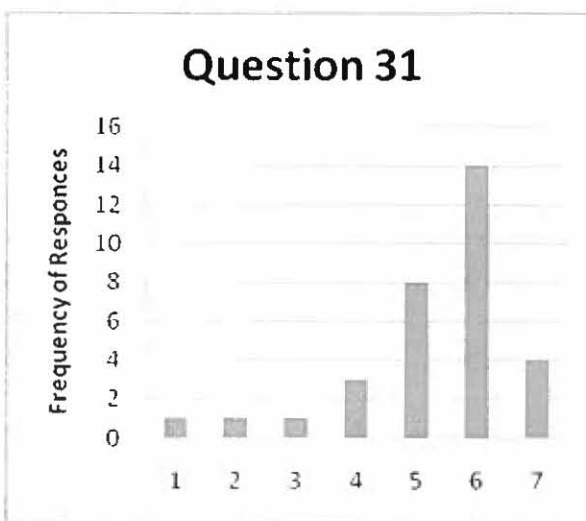


Figure A3-1 Simplicity

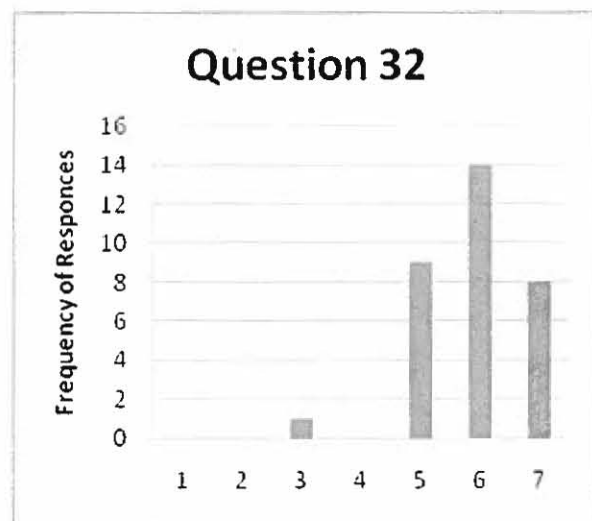


Figure A3-2 Easily remembered

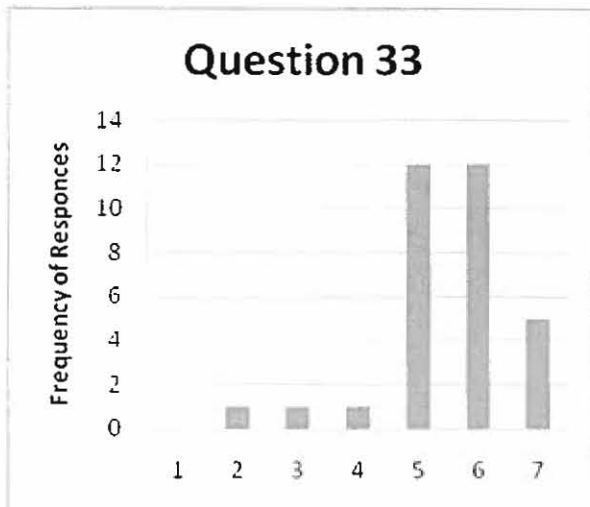


Figure A3-3 Speed of execution

Figure A4 Acceptability Ratings of the CT114 lap belt checks

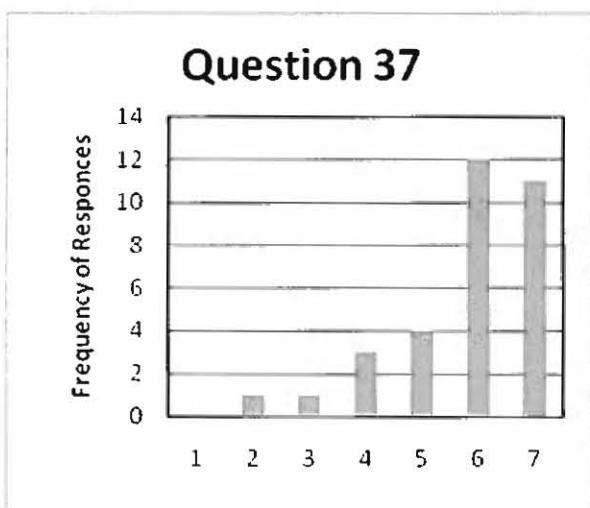


Figure A4-1 Ease-of-use in performing visual check

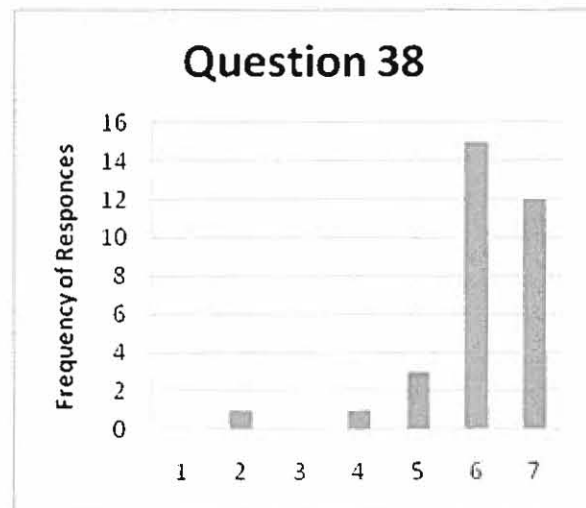


Figure A4-2 Ease-of-use in performing free play (push past) check

Listing of Individual Comments per Section

Acceptability of Training

Question 19. *Recommendation of changes to CT114 lap belt training?*

- 1) Upon seat check, strap-in is often not supervised. It is verified upon completion that they are strapped in correctly, just not the procedure itself. Incorrect step by step is very possible.
- 2) On the road, training should be c/o with training aids, not in the a/c.
- 3) Emphasis must be placed on the fact that the issues with the lap belt are not resolved, no matter what personnel comes in.
- 4) 6 mons is too much, should go back to 1 year for pilots.
- 5) Rotating cam should be coloured, easier to see.
- 6) Video and computer graphics. Better presentation media may help.
- 7) Make it more specific, either during ejection training or separate annual briefing.
- 8) Potentially discuss previous accidents and causes highlighting the limitations of the lap belt.

Question 22. *Comments regarding CT114 lap belt training received?*

- 1) Extensive, highlights on the lap belt issues.
- 2) Should include flight safety reports and death/injuries, briefs related to CT114 lap belt problems.
- 3) Good, once we received it.
- 4) Show team pilots could give seat checks to other non-type qual'd aircrew. Pilots that fly in the seat everyday are more than capable and qual'd to give seat checks.

Acceptability of Lap Belt Operation

Question 30. *Recommendation of changes to the CT114 lap belt lock mechanism*

- 1) Leather flap gets in the way, hard to connect, winter flying gear too bulky and tight in the cockpit and convoluted strap-in procedure.
- 2) Low scores related to winter flying gear - too bulky and makes strap-in difficult.
- 3) Visible indicator to see false lock. Paint or glow paint for low visibility.
- 4) Cannot see cam lock with winter gear on.
- 5) Not qualified to speculate on this system. It's awkward but it works.
- 6) "Fail safe" mech would be nice to ensure pilot is in seat in the event of a failure of the belt when inverted. It has never failed me but I did lose a close personal friend. It has a known problem with the potential of a false lock.
- 7) Hard to manipulate with winter gloves, complicated mech and hard to keep all parts in place when locking, cam should be coloured.

Annex C – Questionnaire results

- 8) Make the yellow webbing metal.
- 9) Never worn winter clothing, and don't know enough about the belt.

Acceptability of Strap-In Procedure

Question 35. *Concerns regarding the CT114 lap belt Strap-in-Procedure as detailed in CFTO?*

- 1) Very easy to miss seat pack connection, then quite difficult to detect the error then correct it.
- 2) Fairly complex strap-in. Potential exists for mistakes. Practicing the Strap-In should be stressed.
- 3) Speed of execution not a big operational requirement. No requirement to scramble.
- 4) Lengthy strap-in procedure.
- 5) Complicated compared to other harnesses, easy to miss critical steps.

Acceptability of Lap belt Checks

Question 39. *Concerns regarding safety procedures (visual check and push past test)?*

- 1) Push past and visual very difficult in winter kit.
- 2) Visual very difficult, almost impossible at night. Must rely on push-past.
- 3) Poor visibility with winter gear
- 4) Strap-in c/o without helmet - difficult to perform the cam cut-out check, mask disrupts view.
- 5) Belt needs to be completely loosened off in order to see the mechanism past the survival vest and parachute
- 6) Visual very difficult in low light, especially at night.
- 7) Strobe light on LPSV. UCR submitted 2 yrs ago, never heard anything back
- 8) Need to see cam rotation, cannot guaranty lock just by looking at the belt.
- 9) Not so good in the dark.

Question 41. *Have you had anything block or impede the mechanism upon locking the lap belt?*

- 1) Arming key prongs misaligned, buckle and tongue misaligned fore-aft or up-down, belt not fully loosened and wearing bulky clothing.
- 2) Bunny pants.
- 3) Clothing.
- 4) Flight suit caught in between, not able to lock the belt until flight suit was removed.
- 5) Strobe light.
- 6) Key not properly positioned.
- 7) When you have the wrong angle, it sticks, need to undo then redo again.

Additional Comments

Question 45. *Additional comments regarding the ease-of-use of CT114 Strap-In-Procedure?*

- 1) Should be simple and routine, requires too much attention to detail. Suggestion - fix the gear not change human nature.
- 2) Get rid of bunny pants, use ECWU, makes strap-in and moving in cockpit easier.
- 3) Constraints on space in cockpit, time would be a concern.
- 4) Tutor seat check is every 3 MOS for FTE's, every 6 MOS for pilots. # MOS for FTE's seems too frequent.
- 5) Full metal key.
- 6) Obviously older generation system. Must stress to new pers that it is not a perfect system, stress "healthy difference" and attention to achieving a lock is not lost.
- 7) Female techs are not comfortable doing the push past test.
- 8) Strobe light on LPSV gets in the way.

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(U) 1 Canadian Air Division Head Quarters, Air Force Readiness 3, requested DRDC Toronto perform a user evaluation of the Canadian Air Force modification on th CT114 HBU-12/B Bartack Lap belt Parachute Arming Key. After performing human factors performance tests and user questionnaires it was concluded that the CT114 user community has confidence in the modifications.

(U) Not available

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(U) CT114, lap belt

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